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NASA TECH BRIEF



This NASA Tech Brief is issued by the Technology Utilization Division to acquaint industry with the technical content of an innovation derived from the space program.

Emission Tester for High-Power Vacuum Tubes

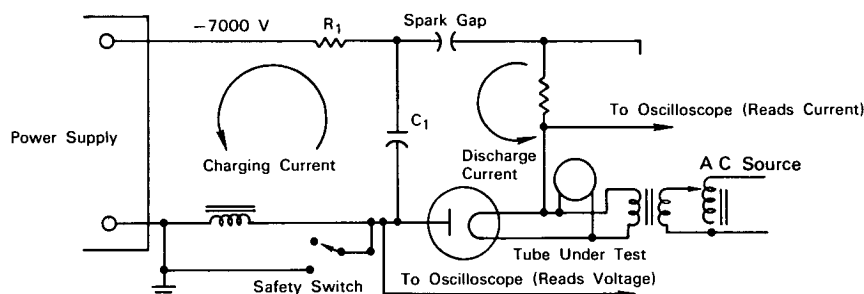


FIGURE 1

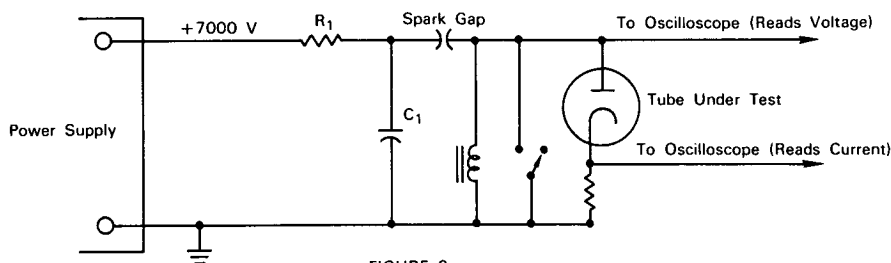


FIGURE 2

The problem: High-power vacuum tubes such as transmitter tubes must be checked frequently for output stability. This requires high-power input pulses in the order of hundreds of kilowatts.

The solution: A simple, safe circuit that uses the transmitter power supply as its source.

How it's done: Figure 1 illustrates a power supply with a negative output. With the safety switch in the position shown, the power supply charges C_1 to about $-5,000$ volts through R_1 . During charge, the lower terminal (as shown) of C_1 is at a virtual zero potential due to its low-impedance path through the choke to ground. At about $-5,000$ volts, the spark gap breaks down bringing the upper terminal of C_1 to near

ground potential. The choke exhibits high reactance to the sudden rise of potential on the lower terminal of C_1 , but the tube under test, being a relatively low-resistance load, discharges C_1 . This cycle is repeated about 20 times a second. The voltage and current components of the tested tube's emission are measured on an oscilloscope as indicated. Since peak emission varies with filament voltage, the test set includes a variable ac source and voltmeter. The safety switch is placed in the closed position while the tube to be tested is connected or disconnected. Figure 2 shows the tester as it would be assembled for use with a positive high-voltage supply. The choke is not essential in this case but is included as a dc short for personnel safety.

(continued overleaf)

Notes:

1. With minor modifications this circuit would be useful for testing mercury-arc rectifiers or germanium and silicon high-current rectifiers.
2. Inquiries concerning this innovation may be directed to:

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Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated.

Source: Clarence Lundy
(JPL-628)